Hobbies WEEKLY

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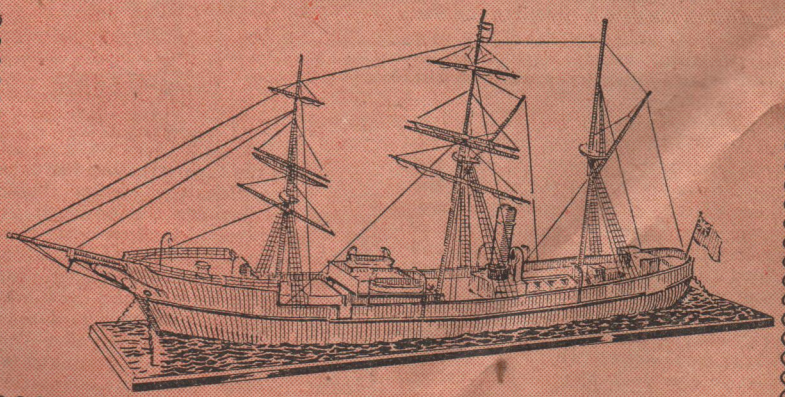
DESIGN SHEET FOR MODEL OF 'DISCOVERY'	

Making a grand model of the Royal

RESEARCH SHIP 'DISCOVERY'



MANY of our readers — and especially the Sea Scouts among them—will welcome a design for a waterline model of such a famous vessel as the Royal Research ship 'Discovery', now used as a Sea Scout training ship.

Who has not read of the epic voyages of Captain Scott and his gallant associates? Who, in making this model, would not feel proud to find it a place of honour among his collection?

As ship models go, it is straightforward enough, and there is no part of the construction that is not within the capabilities of the younger worker. Built on the bread and butter principle, the main part of the structure can be completed in a comparatively short time, principal care being required later, when the superstructure, fittings and rigging are added.

How to Begin

Begin by transferring all the parts to the required wood with the aid of a pencil and a piece of carbon paper. Sticking the parts of the design sheet to the wood is not to be recommended for two reasons: (1) once the design is cut up and thus disposed of it cannot be used again, even for reference. (2) Having been stuck on the wood, it later has to be cleaned off, and this, when you are anxious to get on, can be a soul-destroying task.

Actual construction can be commenced by cutting out the hull piece and shaping the bow and stern as indicated by the dotted lines on the design sheet. Do not confuse these dotted lines with the one running close to the edge of the hull piece, and which is intended to indicate the position of the deck.

A Design for this model is FREE INSIDE

This latter piece is cut from ¼in. wood and if a G2 panel (9ins. by 4ins.) is used, as in the kit supplied, it is cut in two separate pieces as shown.

The deck should now be glued into position on the hull piece and the worker can then proceed to cut and shape the bow block, foredeck and piece (B), which forms the stern deck. He can also cut the bow piece.

The bow piece, bow block and foredeck are then assembled as seen in Fig. 1, and piece (B) is glued to the stern end of the deck. Further reference to

Fig. 1 will show the deck inset slightly from the edge of the hull piece (as explained earlier), and this inset is designed to accommodate the two upper sides which are cut from 1 mm. ply or, if preferred, good quality Bristol board, and which are glued around the deck so that the hull and upper sides then form perfectly flush sides to the vessel. When the glue is properly dry, any slight irregularity should be cleaned off so that the sides really do look like one smooth whole.

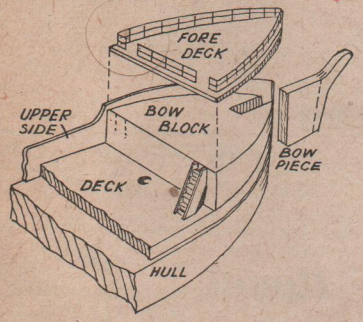


Fig. 1

When the worker gets this far, the main bulk of the ship is complete and the rest of the work entails fitting the superstructure, masts, rigging, etc.—more exacting work, probably, but quite absorbing.

All the masts (there are six in all, as the three main masts are each in two parts) and spars, should be cut and shaped from $\frac{1}{8}$in. dowel rod, and all the other pieces of the superstructure, shown for the most part on the side of the design sheet, should be cut and shaped to the sections given. When all these pieces have been made, it is merely a question of assembly on the deck, etc., and the positions of the various parts are shown by the dotted lines on the deck plan on the design sheet.

'Planking' the Deck

Before the pieces of superstructure are glued to the deck, however, the latter should be treated so as to appear as planks. This is a simple procedure and merely entails the drawing of parallel lines the length of the vessel (except for the stern piece (B) which is decorated as shown on the design sheet). The instrument used should be a sharp-pointed pencil, and having in view the scale of the vessel, which is approximately $\frac{1}{12}$in. to 1ft., the lines should be about $\frac{1}{16}$in. apart to represent 12in. deck planks.

Fig. 2 will give the worker a clear idea of the layout of the bridge, and it should be mentioned in passing that the suggested cardboard rail can be made quite easily in 1 mm. ply if desired. However, even if card is used, if the

A photograph of the finished model

modeller cares to exercise a little patience, the gluing tabs can be dispensed with. The fact that the card is bent will ensure its not falling over, and it can be easily secured with Durofix if just held in position for a minute or two while the adhesive sets.

In Fig. 3 is shown the layout of the unnel, etc., and no difficulty will be experienced in assembly. It will have been noted, of course, that the funnel is in two parts.

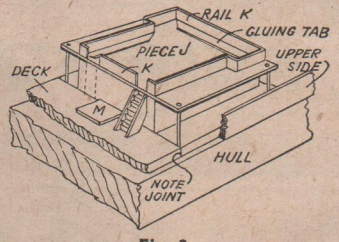


Fig. 2

When all the superstructure has been glued in position, the worker should proceed to assemble the bowsprit (in two parts), masts, lookout platforms, the barrel shaped lookout at the top of the main mast, and the rigging. The shrouds can be made in the usual way with thread wound round a card template, and secured with Durofix. This method has been often described in *Hobbies Weekly* both in connection with design sheets and in Ship Modeller's Corner, and shortage of space prevents us from repeating it here.

This grand model of the 'Discovery' is the subject of Design Sheet No. 2932 published in this issue. A complete parcel of materials for making the model can be obtained from Hobbies Branches, or post free from Hobbies Ltd., Dereham, Norfolk, price 6/3, including tax.

The colour scheme for the craft taken from the official model in the Geographical Museum is as follows. Hull black with white rubbing strakes. There are two of these latter on the actual vessel, but in the model we have kept to one as most model makers have difficulty in painting fine lines. The forward deck houses are brown (oak) with black tops, the aft deck houses white with black tops, locker tops aluminium, the funnel off-white, the vents white and the rails on the foredeck white.

The rails on the foredeck should be made by driving in small pins at intervals to act as stanchion points and then drawing thread tightly around each with a slipknot and securing with a spot of Durofix at each pin. When finished they should be painted white with artists' oil colour. The remainder of the detail in the model is painted in artists' water colour, as this does not give an out-of-scale appearance and is better for small models. After painting, a coat of paper varnish should be given. Oil colour is used for the foredeck rail because water colour does not take easily over Durofix.

The davits should be shaped on a wood former, and the end flattened from both sides, rounded with a file and drilled with a No. 74 drill to take the hoisting

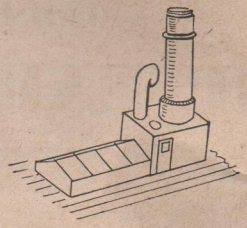


Fig. 3

tackle. There are six of these davits, four used for the boats and two as hoists towards the stern of the craft on the starboard side. There is a seventh davit (T) which is mounted on the foredeck as can be seen in the side view of the craft.

Refinements

Workers who wish to make their models a little better than average, can take a few extra pains with the finishing of their craft. For instance, the ship's boats can be hollowed out with a small model maker's gouge, and the seats, etc., made of veneer. The skylight behind the funnel can be framed with cartridge paper before being painted, and this will give it a more realistic appearance. The barrel lookout can be drilled and turned or filed from dowel and glued on and tied with two bands of thread. Capstan markings should be added in indian ink after the capstan has been varnished and the doors and panels on the deck houses, etc., should also be lined in indian ink after varnishing. Small pin eyelets should be used to secure rigging to the deck.

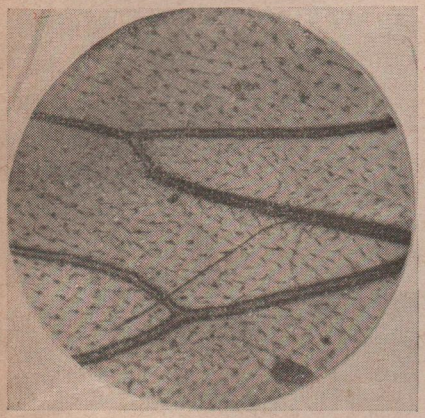
In making the decorative pieces for the bows, these in the first instance are cut from thin card and glued into position as shown. Paint some fine

(Continued foot of page 228)

An introduction to the hobby of
AMATEUR MICROSCOPY

FOR many years the microscope has been used by those working in different branches of science; and, in fact, the application of the microscope has almost become a science of its own, with many volumes written for the benefit of those seeking to apply it.

Recently, however, microscopy has developed not only into an exact science, but also into a hobby.



How a wasp's wing looks under a microscope

One sees microscopes advertised at a cost of between £100 and £200, but very serviceable models are available for the amateur or student at less than £10, and every Christmas, leading toy shops and opticians sell scores of small models that are not to be despised. So many of these low priced models have now been purchased that a new hobby has come into being, viz., Amateur Microscopy.

A prominent scientist said: 'A microscope to a man with sight is as revealing as sight would be to the blind'. This may or may not be true, but it is certainly nearly true.

Such ordinary creatures as a common house fly or a wasp, either of which we should kill at sight in the ordinary way, can give hours of interesting study, and you have specimens mounted for future reference at the end of it. Further studies can come from a moth or a daisy, in fact there is no limit to the number of subjects to be found in everyday life.

For the expert there are scores of different mountants, to be used, according to the specimen and its condition. For exact work it is best to use the most suitable mountant for each particular case, but for the examination of an insect's wing through the instrument, most amateurs are likely to possess one drop of gold size, canada balsam, or even seccotine. With the object placed on top, on a glass slip, a cover glass then pressed lightly on top, gives a quite satisfactory mount. This, simple as it is, and open to so many objections from the point of view of the man using an expensive model, is decidedly preferable to the 'gum-paper method' of fixing specimens recommended with so many of the low-priced sets.

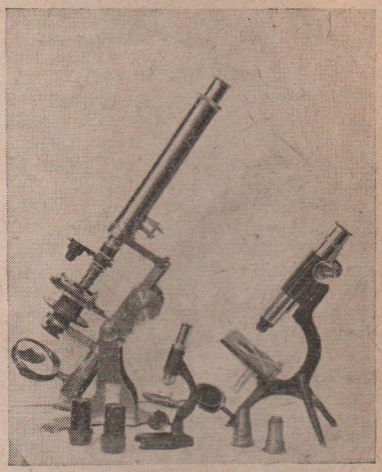
Textile Fabrics

For mounting textile fibres, glycerine jelly is to be recommended as a mountant. This can be purchased ready-made, or can easily be prepared and it has the advantage of being used warm and setting, ready for use much more quickly than many mountants.

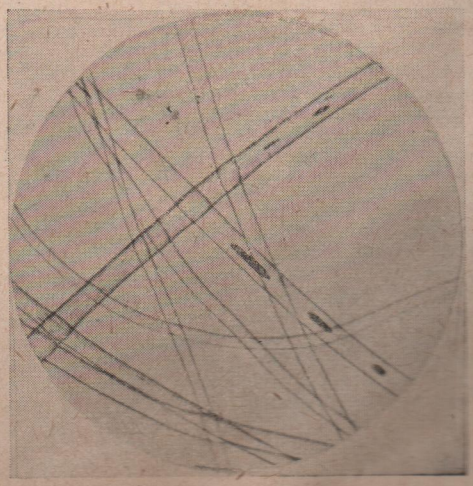
Whichever mountant is used, a glass slip of standard size, i.e. 3ins. by 1in. is to be recommended and although cellophane and similar 'substitute glass' cover-glasses are now available, they should be avoided when real glass ones can be obtained for about ½d. each from any reputable microscope dealer.

There are many simple methods of preparing insects and botanical specimens, and of staining them to make them more suitable for careful observation, but none of these are really necessary for the youth who wants to use a simple instrument. They are advisable, however, when one is preparing a set of slides for permanent reference, and every amateur microscopist is advised to make such a collection. Yet it is not necessary in order to get many happy hours with any simple instrument. Almost any particle of insect life, the hair of any animal, fibres such as cotton, flax, hemp, rayon, nylon, etc., etc., samples of different makes of paper, specimens of different types of dust and the pollen of different flowers, will all make interesting mounts to intrigue the amateur before he develops more advanced techniques.

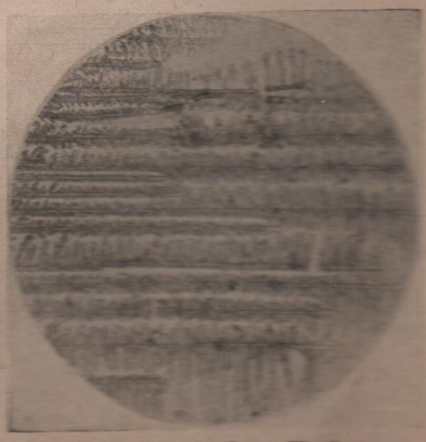
(164)



Some inexpensive instruments



A specimen of camel hair greatly magnified



An interesting case of crystallisation

Lifeboat to Cruiser

I AM converting a 26ft. by 8ft. lifeboat into a cabin cruiser, and would be glad if you can tell me the best means for my engine requirements (secondhand), size of prop, etc. (H.B.—Clapton).

AN engine of about 8 to 10 h.p. would be suitable for cabin cruiser of 26ft. length. A propeller about 12 to 15ins. diameter and 6 to 8ins. pitch with three blades would be appropriate, but actually the propeller should be carefully suited to the engine speed and power. As you will probably use a secondhand car engine, a shaft speed of some 1,200 to 1,500 r.p.m. would be appropriate as a cruising speed of some 8 m.p.h.; for higher speeds a much more powerful engine would be needed with a propeller of appropriate dimensions.

* * *

Pottery Repairs

I HAVE started repairing porcelain, pottery, glassware, etc., and have several fairly good patent cements, but am wondering if you know of any recipes or makes of cements which would be particularly suitable for this type of repair work. Could you also give me a recipe for a compound which I could use for the remodelling of broken pieces such as replacing a broken off hand, etc. I use plaster of paris but fear that this may not be permanent enough. Could you also give me an idea of how riveting of china is done, approximate gauge of wire used, etc. (F.D.—Pt. Elizabeth).

AN adhesive for china is composed of isinglass dissolved in acetic acid; shred the isinglass, put it in an old cup and pour on a few drops of acetic acid, just enough to dissolve the isinglass. Use it without delay, it makes an almost invisible joint but is not proof against water. An alternative filler is composed of whiting or slaked lime mixed to a paste with white of egg. Modelling clay can also be used, but takes some time to dry, also you could use a paste known as Barbola, which is obtainable from an artists' supply shop. Riveting is generally done with soft copper wire about No. 20 gauge, but can be varied to suit the size of the job. Holes are drilled with a sharp pointed hard twist drill of appropriate size, and some $\frac{1}{4}$in. or so from the edge a corresponding hole is drilled in the opposite piece and the parts drawn together by the copper wire, the ends of which are twisted up on the inside. Cellulose enamels are very suitable or any of the synthetic paints. Waterproofing can best be achieved by coating the interior of the vase with gold size or shellac varnish, then press a piece or pieces of thin silk on to the moist gold size, until the whole is covered, then apply several coats of shellac or gold size, or any coloured enamel poured in and poured out again.

* * *

Cutting Tops From Bottles

I HAVE a few wine and spirit bottles with the wide bottom and narrow neck, and would like to use them for drinking jars for my hens which are in batteries. Is it possible to cut off the neck together with part of the bottom and so allow the hens to get their heads in? (L.T.—Blackpool).

THE most practical way to cut the bottles will be to use an ordinary glazier's diamond and cut clean around the bottle. A strip of paper pasted around the bottle will ensure a straight cut if the diamond is worked close up to the edge of the paper. Once the cut has been made, the cut should be lightly tapped with the wooden handle of any light tool; this causes the cut to extend through the glass. When cut, it will be well to remove the sharp edges by means of coarse emery paper and water.

* * *

Moulding Troubles

I HAVE been trying to make a name and address stamp, but with no success either with rubber or lead. The latter I tried by cutting a mould in plaster and pouring in lead, but this did not work as it got an airlock under it when I poured the lead. I would be obliged if you could help me with this, and also explain how rubber ones are made. (F.A.K.—Woolwich).

TO avoid getting air-locks in lead castings of letters or the like, it is necessary to drill fine air holes at all points where the air is likely to 'lock'. These holes can be as small as a No. 60 drill (about 38 thousandths) and after the lead casting has been removed the 'spew' can be cut away and the working faces of the lead flattened and polished. Rubber letters can be made by filling a mould with raw dental rubber or other fine rubber, and then vulcanized in the usual way, but only sufficiently to form the rubber and not harden it unduly.

* * *

Filling Cracks

I WISH to wax polish a wood floor, but need to fill in all wood cracks first. To do the whole floor with plastic wood would be too expensive. Is there any other substance or compound that will do the job? (R.W.T.—Carlisle).

ANY rather wide gaps should be filled with slips of wood, glued both sides and lightly hammered in, being afterwards planed off level. All other cracks should be cleaned out with the blade of a knife, and then filled up level with putty and white lead kneaded together. If staining is contemplated, stain before the stopping is carried out and then colour the stopping to match the stain with a little dry colour worked in to suit. The floor should be dusted off before waxing.

Model 'Discovery'—(*Continued from page 226*)

sewing thread with gold paint and allow it to dry. Now coat the cardboard bow pieces (already painted black) with slow-drying liquid glue, cut the gold thread into suitable pieces, place it on the glued bow pieces and work it into the design with the point of a needle.

For those unable to paint a white line round the hull, first paint a strip of gummed paper tape white, with artists' water colour, then cut off a very narrow strip with a straightedge and razor blade and gum into position round the hull.

Except for touching up here and there, the model is now pretty well finished, and all that remains is to mount it on its base which is cut from a panel 3ins. wide by some 14ins. long. This panel may be left plain, and just wax polished or stained or it may be finished in any way which appeals to the individual. For those who wish to make an imitation 'sea' here is a good method for small models. First, paint the wood base blue, then coat it with Casco glue. Lay on this a covering of one sheet of thin cellophane.

Now, before the glue sets, coat the bottom of the ship model with the same glue, and place the model on the base slightly back from the position you really wish it to occupy, and then push it forward to its final resting place. This will wrinkle the cellophane into very realistic scale size ripples. Paint the tops of these ripples with white oil colour round the ship and in her wake, and afterwards finish off the whole thing with paper varnish.

A SCOOTER A BOY CAN MAKE FOR HIMSELF

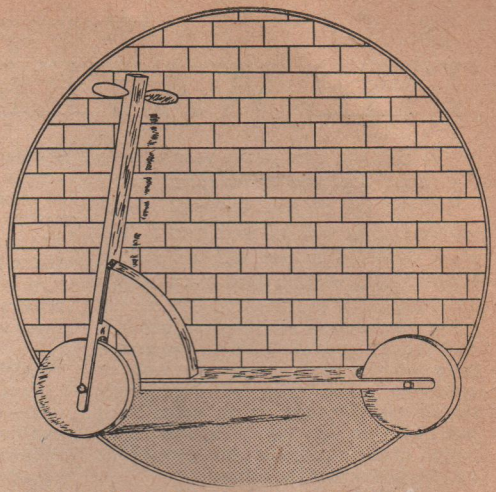


Fig. 1—The scooter ready for use

MOST of us have, I think, at some time or other, longed for a handy little scooter of our own. But all too frequently, in the face of father's refusal or inability to buy one for us, we have had to go without. However, if you are prepared to work with me on the model shown in the accompanying illustrations, this state of affairs need no longer exist for you. And really it is quite simple to make.

Practically all the tools and materials required to complete the job are to be found in the average home. These consist of a saw, chisel, file, drill, pencil, ruler, compass, sheet of medium glasspaper, two or three pieces of 1in. thick wood, short length of strong metal strip, three sturdy bolts and nuts, short length of metal bar or tube, couple of file handles, length of discarded cycle tyre, couple of screws, glue and paint.

First things first, let us make a start with the platform. For this a piece of wood 1ft. 9ins. long by 4ins. wide by 1in. thick will be required. Put a 2in. radius on the forward end, then, at the same end, cut a 1in. wide slot 3ins. deep centrally on the broad face of the board through the 1in. thickness of the wood. At the opposite end cut a similar slot, this time 1½ins. wide by 5in. deep radiused ¾in. at the inside end. The result should appear like Fig. 3.

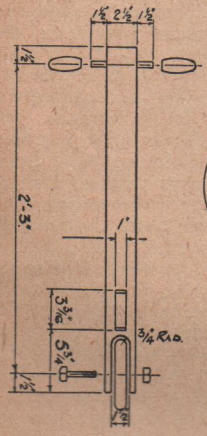


Fig 2.

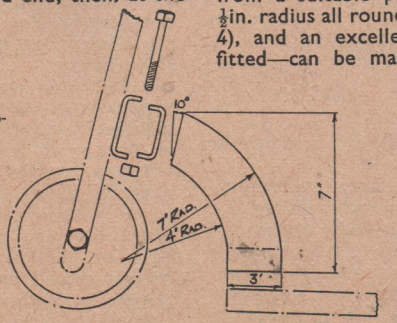


Fig 4.

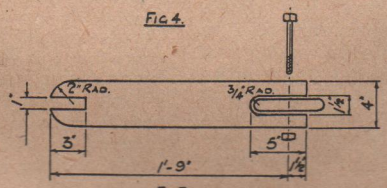


Fig 3.

Now to produce the neck (Fig. 4). Draw a 3in. base line on a 1in. thick block of wood and project two 1in. parallel vertical lines from each end of same. Join up the ends. Now, inscribe a 7in. radius connecting one of these ends to a point where it bisects a line parallel to and 7ins. above the base line. Inscribe a second radius, this time 4ins., connecting the other end to a line dropped from the upper end of the outer radius at an angle of 10 degrees. Cut out this shape.

The steering column consists of a length of wood 2ft. 6ins. long by 2½ins. wide by 1in. thick. Cut a slot 1½ins. wide by 7¾ins. deep with a ¾in. radius at the inner end centrally on the broad face of the column at one end through the 1in. thickness of the wood. This should result in the shape shown at Fig. 2.

If you have not sufficient money to buy a pair of wheels 6ins. diameter by approximately 1in. thick, cut a pair from a suitable piece of wood. Put a ½in. radius all round the rims (Figs. 2 and 4), and an excellent tyre—if properly fitted—can be made from the central tread of a discarded cycle tyre. Both wheels should also be drilled centrally to run freely on a ⅜in. diameter bolt.

To return to the platform, put a ½in. radius on the ends of the wheel forks (Fig. 1). Then, at a point 1½ins. in from these ends, drill a ⅜in. diameter hole centrally across the broad face of the board. Set the rear wheel in position, with a large washer on either side, and insert the ⅜in. diameter bolt. Screw on the nut and secure by peaning over the end threads with a centre-punch.

Mount the neck, suitably coated with glue, in the slot at the opposite end of the platform. Secure firmly with a couple of stout wood-screws inserted towards one another across the broad face of the platform and passing through the glued portion of the neck itself.

A piece of strong metal strip roughly 5ins. long by 1in. wide by ⅛in. to ¼in. thick bent over at right angles 1½in from each end, and drilled to take two or three heavy wood-screws, should now be firmly fixed to the opposite end-face of the neck. The way of this is shown at Fig. 4.

Put a ½in. radius on the ends of the front forks (Fig. 4). At a point 1½ins. in from the ends of the forks, drill a ⅜in. diameter hole centrally across the broad face of the steering column. Set the front wheel in position, with a large washer on either side, and insert the ⅜in. diameter bolt (Fig. 2). Screw on the nut and secure by peaning over the end threads with a centre-punch. At the opposite end, again 1½ins. in from the face, drill a ¼in. or ⅜in. diameter hole centrally across the broad face of the column to take a 5½in. length of bar or tube of these dimensions. Leave 1½in. of the bar or tube projecting on either side (Fig. 2). A couple of large file-handles drilled ¼in. or ⅜in. diameter at one end to a depth of 1½ins., and forced onto the projections of this cross-bar, form a very suitable handle-bar.

A further piece of stout metal strip, this time roughly 6½ins. long by 1in. wide by ⅛in. to ¼in. thick, bent over at right angles 1½ins. from each end, and drilled to take two or three heavy wood-screws, should now be firmly fixed 5¾ins. up from the ends of the front forks onto the back face of the steering column (Fig. 4). Line-up the four holes, previously drilled to allow free movement of the steering brackets on the ⅜in. diameter bolt, and insert the bolt with a large washer under the head. Screw on the nut with a large

(Continued foot of page 230)

How to repair and protect
THE WATER SUPPLY SYSTEM

THIS is the time of the year when a little time and effort spent in the overhaul of the domestic water supply system will be well repaid. The work involved is not difficult and, if handled methodically, need not occupy a lot of time.

No special tools are required but it is desirable to have available an inspection lamp with a lead sufficiently long to reach to every part of the supply system and, if the loft or roof space is not boarded over, it is a great help to have a length of floor board available so that it may be laid across the joists.

Inspection

Inspection should begin at the stop-valve on the incoming or rising main.

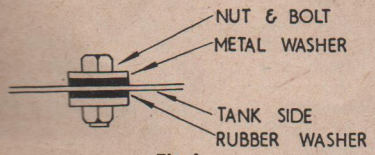


Fig. 1

This is normally sited close to the point where the main enters the house, the almost traditional location being in a cupboard beneath the stairway. The valve should be tested to make sure that it is working efficiently and that it can effectively close down the incoming supply. Any defect here should be remedied without delay as in addition to increasing the amount of damage in the event of a pipe or other apparatus bursting, it also constitutes a breach of the water company's regulations.

The next part of the job consists of following the pipe run, noting particularly any places where the pipes are exposed to draught or negotiate any sharp bends. These are places where freezing might be expected and where extra protection will be essential if the position is such that the pipe has only the limited insulating quality of the roof to give protection from the weather.

The storage tank—and its associated taps and valves—should next be inspected and, if these are in any way defective, repaired or replaced. The cost of a new storage tank might well amount to £5 or £6, or even more where the larger sizes are involved, but this cost is small in comparison with the cost of remedying the damage which can result from the bursting of the tank. The usual size of storage tank holds about 50 gallons of water which can go a long way if it gets out of control. Minor repairs can sometimes be effected and these will be dealt with later.

Repairs

Taps and ball-valves should be re-washered if necessary and outlet and overflow pipes cleared of any dirt or rubbish which may be causing an obstruction. It is also advisable, if the tank is rusted or soiled, to switch off the incoming supply and empty and clean the tank. The water and sediment in that part of the tank below the level of the outlets can be removed with an old

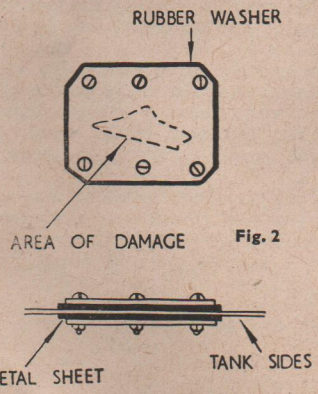


Fig. 2

cup or mug and finally with a sponge or flannel.

When the tank is empty the sides and base should be carefully examined for defects. If the tank is badly rusted and obviously weak it should be replaced—there is no other answer to that problem. If, however, the tank is reasonably sound but subject to one or two weak places which are small and readily accessible, the damaged parts may be drilled and repaired with rubber and metal washers secured in position with a steel bolt. The method of assembly is shown in the accompanying sketch, Fig. 1. Larger but localised damage may sometimes be repaired after the same fashion except that metal sheets are used instead of metal washers. This is shown in the sketch, Fig. 2. Washers which are well suited to this purpose can be made from ex-motor car or cycle inner tube material provided, of course, that the piece selected is clean and in sound condition.

Small cracks and fissures in the valve-ball can be repaired by running solder over the affected part, but if serious damage is present, a new ball can be bought and fitted in place of the damaged one.

When the tank is refilled the opportunity should be taken of testing the outlets and overflow pipes to ensure that they are functioning correctly. Leave one of the taps open while the system is re-filling, to avoid the inconvenience of an 'air-locked' pipe.

Protective Work

The storage tank and all pipes in the roof space should be covered with any suitable protective material that may be available. This may be felt, strips of old carpet, straw, corrugated or brown paper or, if none of these are available in sufficient quantity—newspaper. The tank should be provided with a wooden cover but extra protection in the form of old rugs or a blanket will be an advantage.

Pipes should be wrapped with whatever material is available. The amount of wrapping required depends entirely on the kind of material used. Thick felt or strips of carpet will generally need only one layer of wrapping; straw to the thickness of about ½in. all round; corrugated paper to two layers; brown or newspaper at least six thicknesses wrapped loosely for preference. The wrapping should be secured every 6ins. or so with string loops. Any places where the pipe turns through a sharp bend or is likely to be exposed to draught should have twice the amounts of material mentioned.

Draughts should be eliminated so far as possible—ill-fitting or only partially closed windows being fruitful causes of trouble in this connection. If it is found impossible to eliminate a draught which is likely to bear on any part of the water system, it is well worth the trouble involved in making a rough draught screen of scrap wood covered with any suitable material on hand. (210)

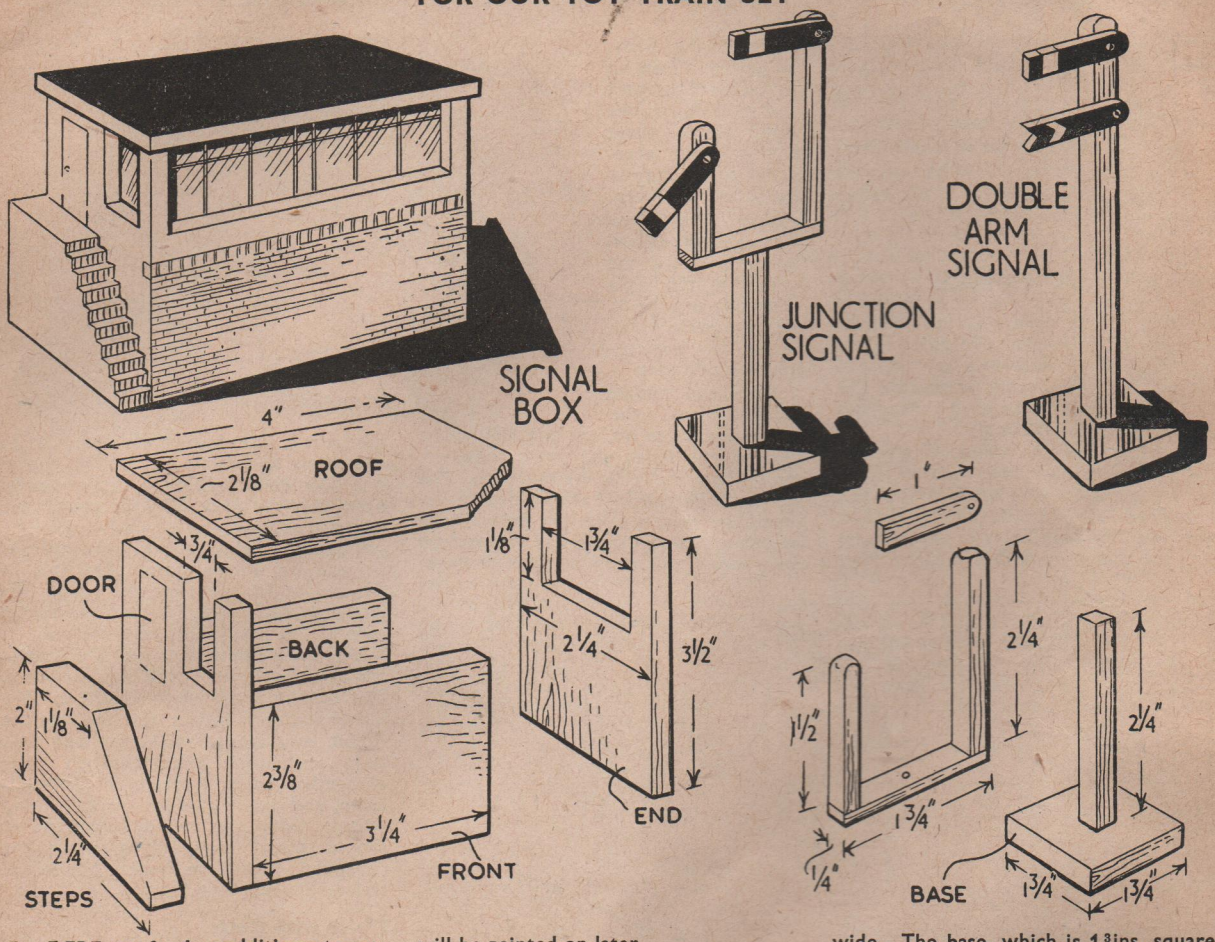
A Scooter—(*Continued from page 229*)

washer under that, too, and secure the whole by peaning over the end threads with a centre-punch.

Finally, ensure that all the parts are thoroughly sandpapered smooth before proceeding to put on the finishing coat(s) of paint. How do you fancy a red platform and steering column, green wheels, black steering brackets and natural coloured handles? The latter effect is obtained by using a clear varnish on the raw wood. (191)

SIGNAL-BOX AND SIGNALS

FOR OUR TOY TRAIN SET



HERE are further additions to our Toy Railway layout. The signal box illustrated has a modern flat roof and realistic steps leading up to a dummy door. As usual, all necessary measurements are shown and these apply only if the thickness of wood recommended in the instructions is adhered to. It will be easy to modify them if thinner wood or cardboard is used.

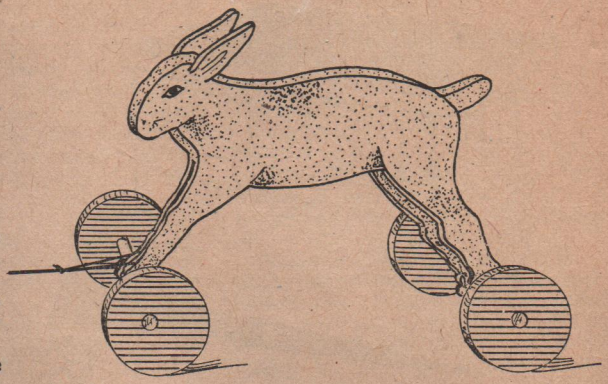
The diagram shows that the main parts are the two ends, the back and the front. The latter are two plain rectangular pieces of ¼in. wood but the ends are shaped. First cut out to the main measurements, 3⅜ins. by 2¼ins. by ¼in. and then cut the window openings as shown. Notice, particularly, the way of the grain, which must on no account run the other way, or the upright pieces will snap off while assembling. The door will be painted on later.

The thick piece of wood forming the steps is now cut and the steps themselves either filed in or cut with a fretsaw. This piece is cut from ½in. wood and is glued to the end as shown. Before the roof is glued in place, a piece of transparent celluloid can be cut to shape and glued behind the window openings. One long piece, bent to fit the corners, should be used. It should extend well below the window openings to allow small drawing pins to be pressed into place to hold it secure. The top is cut from ⅛in. wood or card, and pinned and glued in position.

Two types are shown, but since both are of similar construction we have only given details of the Junction Signal. The upright pieces are cut from ¼in. square stripwood and the signals themselves from tin or ⅛in. wood. The supporting bracket is also of ⅛in. wood and is ¼in. wide. The base, which is 1¾ins. square can be cut from ¼in. or ⅜in. wood. The lower upright piece will be screwed to the base and the supporting bracket. The double arm signal is also constructed of ¼in. square stripwood and ¼in. wood for base, and the height of the upright piece is 4¾ins. The signal arms are screwed in place. Tighten the screw enough to hold the signal in place when it is moved.

The signal box will have a grey roof and the sides, etc., can be painted cream half-way down and red below this. Lines can be painted on the transparent celluloid to represent window bars. The door can be painted brown or green. The signal arms, home and distant, should be painted red and white, the main portion being red. The uprights are usually white, and the bases can be bright green to add a touch of colour. (194)

It isn't hard to make a PULL-ALONG TOY RABBIT



FOR a young child this would make a pleasing toy. As the rabbit is pulled along, it lopes up and down, as in the act of running. No intricate mechanism is involved, the motion of loping being created by an eccentric axle between the fore legs, so nothing is likely to go wrong with the 'works'.

Three Pieces

For the rabbit, it is suggested to use ⅜in. wood and ½in., the latter thickness for the middle part, the rabbit being built up of three pieces of wood, glued together. If a hardwood can be employed for the outer pieces, all the better, but deal can be used throughout if nothing else is available.

A pattern for the rabbit is given in Fig. 1, drawn over 1in. squares. Copy these squares full size on to thin paper, and draw the outline of the rabbit carefully. The axle holes in the feet are ⅜in. and the semi-circles outside them

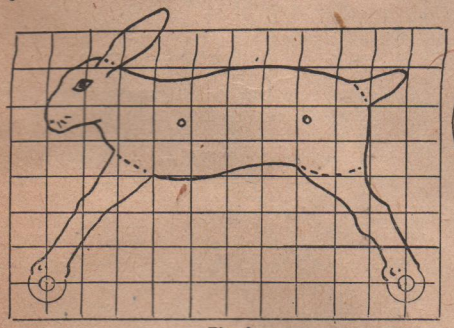


Fig. 1

1½ins. These are best put in with the compass for greater accuracy. Lay the pattern on to the ⅜in. wood and trace the animal through carbon paper. Trace the whole rabbit, except the tail and ears. Where shown by the tiny circles in the body, make holes with a bradawl.

Cut out the pattern, clean up the edges to remove splinters and any roughness caused by the saw, then lay it on to the second piece of the ⅜in. wood, and run a pencil round the outline. Saw out this second piece, and place both together, fastening them temporarily with two nails, driven through the bradawl holes already made. Now bore the axle holes through the feet, both together, to ensure uniformity.

Lay the pattern on to a piece of ½in. wood, and trace the outline again. but this time including the tail but omitting the legs and ears, cutting across on the dotted line instead. Make bradawl holes through the body, as before. Clean up the edges of this part and glue it to one side piece, these having been separated again. See the nails join both together, being driven through the bradawl holes, and let the points of the nails stick out enough to act as a guide when fitting on the remaining side part.

Glue the middle piece, place the other side piece on, see the nail points go into the holes and press together, then drive the nails quite home. The axle holes in the feet should then be in true alignment, a necessary point if the wheels are to run truly. Lay the pattern once more, this time on to a piece of

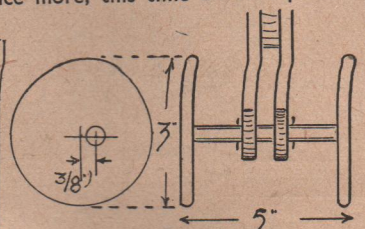


Fig. 2

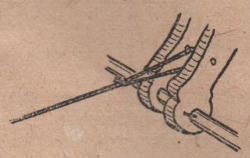


Fig. 3

thin fretwood and trace the two ears through. These are glued and nailed to the head, as in the general view. Go over the edges of the rabbit and well round off all the sharp corners. A little simple shaping can be done to the head and underside of the belly, but nothing elaborate is needed, as a young child is not likely to be too critical of the rabbit's physique.

Wrap a strip of fine glasspaper round a pencil and smooth out the axle holes, but do not overdo it. Now cut the axles from ⅜in. round wooden rod to the length given in Fig. 2, and try in their respective bearing holes. See they are capable of a smooth and even rotation. The wheels are cut from a piece of ⅜in. hardwood, four being required. Cut as accurately to a circle as possible, and in one pair (the rear pair), bore central holes for the axle. Slightly round the edges of all four.

The axle holes in the front pair of wheels are to be bored ⅜in. out of centre, as in the diagram. Glue one wheel to each axle. To keep the rabbit central on the axle, and prevent it riding along sideways, a nail is driven in the axles, each side of the legs, as shown. Cut off the heads of the nails, as they must not rub against the legs as the rabbit runs along. Withdraw one nail, then push both axles through their respective holes. Redrive in the nails again, and finally glue on the remaining wheels. Give the toy a push, and it should travel easily along, with the concentric front axle causing the rabbit to lope up and down.

Finish with Care

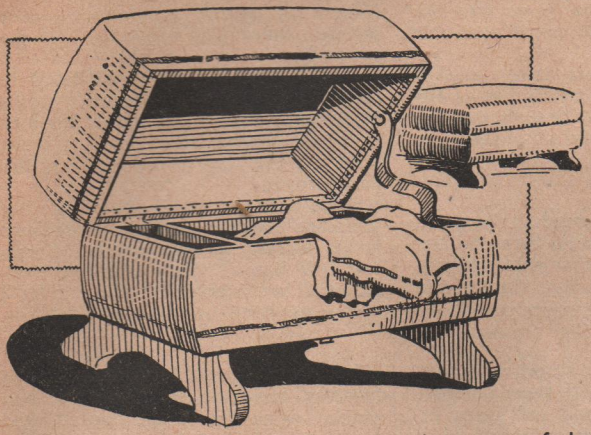
Some care should be taken over painting this toy; a job to be done before the wheels are fitted on. The rabbit can be painted white or grey, or a slaty blue, as preferred. The eyes picked out with a spot of green, and facial details with a fine brush, and dark paint. The wheels any bright colour available, green or red for preference.

For pulling the rabbit along, a cord should be tied to a nail, driven through the front legs, a little above the feet, as in detail, Fig. 3 (204)

Designs are given free with alternate issues of Hobbies Weekly, but not with back numbers

A lady would welcome this combined

WORKBOX AND STOOL



The artist's drawing shows the article in use as a workbox and in the background, closed for use as a stool

HERE is just the thing to make up as a gift. It is useful as a workbox for the busy needleworker, and at times as a rest for the weary feet. As our picture shows, it is a workbox having the usual hinged lid, but is a little out of the ordinary in having feet so that a stool is provided, making, in all, an attractive little piece of furniture for any room.

Simplicity of construction is the keynote in the design of this article, while the finish, being of some stout linen fabric, or even cretonne, is easily carried out.

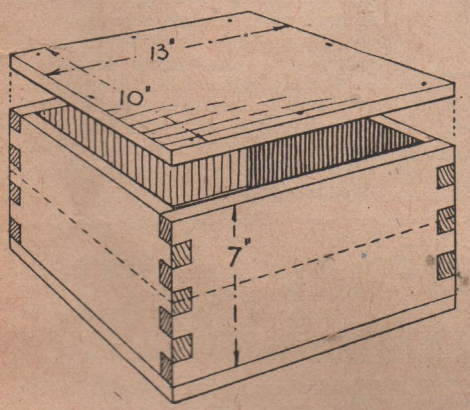


Fig. 1

It is a plain box of four sides and a top and floor all of $\frac{5}{8}$in. or $\frac{3}{4}$in. thick wood. Two boards 13ins. long, and two 10ins. long and all 7ins. wide are wanted for the sides, which should, for sake of strength, be pin-jointed at the corners as shown in Figs. 1 and 2. The wood being 7ins. wide, the tenons of the joints are easily set out 1in. as shown, and they may be cut in neatly with a small-tooth tenon saw with certain cuts being made with a coarse-blade fretsaw. In cutting the tenons keep always to the outside of the drawn lines so that on completion, and when the joints are knocked together, a stiff and close joint will result. There will be some workers, no doubt, who will not trouble to put in the work of cutting the pin-joints suggested, but will have simple butt joints nailed together.

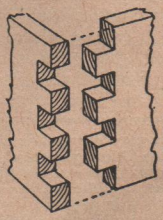


Fig. 2

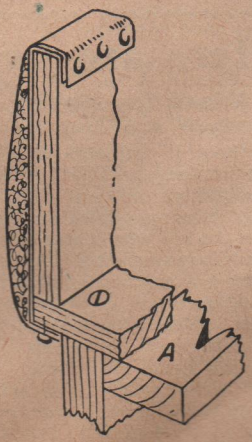


Fig. 3

In this case, it will be seen that two boards 13ins. long and two 8$\frac{3}{4}$ins. long will be wanted, provided $\frac{5}{8}$in. thick stuff is used. If the top and floor of the box cannot each be got from the one piece of 10ins. wide wood, then two 5in. pieces can be jointed and glued up and two small cross battens added to make a strong job. These battens will be screwed to the underside of the lid, of course, and to the underside of the floor, the latter battens being so spaced that they come on the inside of the leg rails. That is, they will be placed 1$\frac{1}{2}$ins. or so in from the edge of the floor, as seen at (A) in Fig. 3. The top and floor will be countersunk screwed to the open frame as Fig. 1 shows, glue being used in addition to the screws, of course.

Halving the Box

The next process will be to saw the box in half on the lines shown dotted in Fig. 1, each portion then being 3$\frac{1}{2}$ins. deep with four of the pin joints being cut as seen. It will, doubtless, be necessary to make up a jig of some sort to hold the box rigid while the cutting is being carried out. When this is done the cut edges should be cleaned off, in fact all outside surfaces may be glass-papered clean, and the sharp edges planed away and made smooth before the outside material is put on.

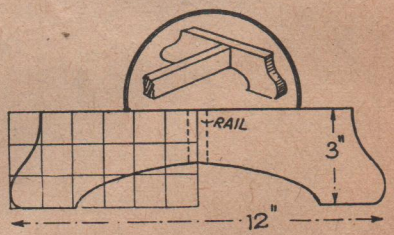


Fig. 4

In Fig. 4 we give an outline of one of the feet, and on one half of this outline is drawn 1in. squares which will facilitate the enlarging to full size. All that is necessary is to draw the eighteen 1in. squares shown on to paper and then to follow the curved lines through each to complete. Now trace this half, and, turning over the tracing paper, proceed to redraw the line on the back. This will make a complete and accurate outline which may serve as a guide for cutting

(*Continued foot of page 234*)

An interesting note on

MAKING LEAF SKELETONS

A JAR half full of water, a saucepan also half full of water, 1oz. or 2ozs. of lime, which can be obtained from a decorator, and a small mop, made by binding the end of a wooden knitting needle with rag, are all the equipment that is needed for 'skeletonizing' leaves.

Set the saucepan, containing the jar of water to which has been added the lime, on to boil. The water in the pan will boil first and, shortly afterwards, the lime water, which should be stirred thoroughly. Drop the leaves into the boiling lime water and continue to stir gently.

Withdraw the leaves at the end of two or three minutes and lay flat on the table. Remove the fleshy surface of the leaf very gently with the aid of the mop.

Both Sides Alike

When you have removed all the green epidermis from one side, turn the leaf over and treat the other side similarly until nothing remains but the delicate tracery of veins. Rinse the white skeleton thoroughly and leave it in the sun to dry.

Should you have any difficulty in removing the green fleshy substance the first time, drop the leaf back in the lime water for another short spell. Do not leave it in too long, or the veins will also be destroyed.

Some of the most beautiful leaf skeletons imaginable can be made from holly, laurel, willow, walnut, beech, and ivy; but all leaves can be 'skeletonized' in this way with due care. (185)

Workbox and Stool—(*Continued from page* 233)

round with the fretsaw after the outline has been transferred to the wood.

Cut the two feet and clean up the edges, and then glue and screw them to the lower box, running in the countersunk screws from the inside as shown in Fig. 3. A stiffening rail may be added between the two feet as shown in the smaller detail in Fig. 4. Screws will again be run through the floor of the box into this rail, and a screw also put through the feet at each end into the end grain of the rail.

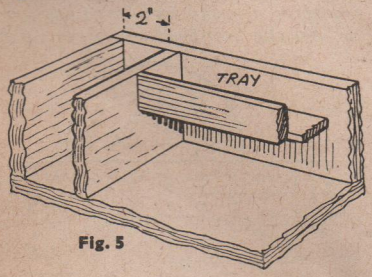


Fig. 5

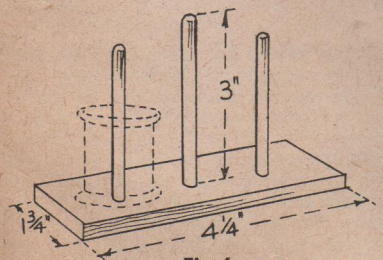


Fig. 6

The box may be divided up with ¼in. thick wood partitions to any plan desired. A suggestion is given in Fig. 5 for forming a tray along one side of the box for containing needles of all sorts, while along one end of the box a partition can be added in which two separate cotton and silk reel stands can be kept. The type of stand suggested is shown in Fig. 6. Here is shown a flat base of ¼in. or ⅜in. wood with three uprights formed from ¼in. round rod glued in. The centre upright is intended as a handle for lifting out the stand which may hold four or more reels on the side uprights. Such a number of stands like this would keep the box tidy, and all the reels would be ready to hand when required.

A coat of clear varnish would suffice to make a suitable finish to the stands and to the tray, and, indeed, to the whole of the inside of the box. The feet should be either stained and varnished or painted, the colour, if the latter method be adopted, being chosen to suit the particular shade of material used for the covering of the box.

Readers may recognise the illustrations on this page as two of the drawings in an article on making a birdcage, published on Jan. 2nd. The inclusion of these drawings was an error, and is regretted.

No particular skill is necessary in covering the two parts of the box which, when complete, are hinged together with a pair of strong 1½in. brass hinges. In commencing the padding of the sides and the top of the box, first stretch over an outside lining of some fairly tough netting material, allowing it to be dressed over the top and lower edges of the box lid, and the top edge of the box itself, the material near the foot being turned round on to the floor as seen in Fig. 3. Small tacks should be used here or, again, the edges could be glued down.

Next lay some padding material, such as straw or horse hair, over each part of the lid and then nail on the chosen outside covering, using brass-headed nails at close intervals. A leather strap should be secured to one end in the box and one end in the inside of the lid to hold the latter in a backward sloping position, and also to prevent the hinges being strained. (207)

Here are two Books of Interest

Wood Toy Making

By W. A. G. Bradman

THIS book is the work of a writer who has long been well known for his contributions to literature on woodworking. An accomplished craftsman, he is one of the few who is able to pass his art on to the reader of the printed word. The book is a welcome addition to the series of Foyle's Handbooks and deals with the subject of wood toy making from the point of view of an ordinary man in his home workshop. To all amateur woodworkers who aspire to make toys, it will be really useful.

Published by W. & G. Foyle Ltd., 119-125 Charing Cross Road, London, W.C.2—Price 2/6.

A—Z Pigeon Guide

By Eric Hardy, F.Z.S.

FOR those whose hobby is the keeping and racing of pigeons, this book will prove indispensable. Written by one of the best known names in the world of pigeon fanciers, it is a complete handbook to pigeon keeping, and will be equally valuable to the novice and the 'old hand'. One of its valuable sections is a month-by-month guide to the keeping of pigeons, and the usefulness of this section alone will more than repay the cost of the book.

Published by Burke Publishing Co., 180 Fleet Street, London, E.C.4—Price 3/-.

THE BRITISH PEOPLE ON STAMPS

(PART 1)

HAVING recently given an account of the English places which appear on stamps, we come to the occasions upon which English men and women appear.

If we start with the Kings and Queens —we all have specimens of stamps showing portraits of Queen Victoria, King Edward VII, King George V, King Edward VIII and King George VI, but with a little searching we can include many more than these.

As mentioned in the previous article, King Richard I is shown, or at least, his statue is shown, on the stamp of Cyprus. He reigned from 1189 to 1199. Nearly 300 years must elapse before we can show the next monarch, and that is King Henry VII (1485-1509), and he appears on the 1897 stamp of Newfoundland of 60 cents value.

Another gap of 100 years must be bridged, and then on the 1910 issue of the same country we have a portrait of King James I on the 1c. value. He reigned from 1603-1625, and the next king was Charles I (1625-1649), who is shown on the 1927 issue of Barbados, the commemorative stamp of the tercentenary of settlement of Barbados.

King Charles II (1649-1685) appears on the 2d. value of Jamaica, the New Constitution set. The first house of Assembly was in 1664 in the reign of King Charles II, and the new constitution in 1944 during the reign of King George VI, hence the two kings appearing.

Then there is a gap of nearly 150 years until King William IV, who appears on the 1d., 1½d., 6d. and 10/- stamps of St. Helena. For the other kings and queens one has a very wide choice. If a portrait album of the Royal Family is required, then turn to the stamps of Newfoundland and you will have no less than ten specimens alone in the 1911 set —the Coronation set. Having said that, it would be rather trivial to list each stamp separately, so we will go on and see what other British men and women have appeared on stamps. The number is really very surprising, as even if one omits all reference to the Royal Family, there are still well over fifty names to mention.

Unexpected Names

There are some quite unexpected names, names which, although they are very well known nationally, but not well known philatically and which one would not expect to see on stamps. For instance, there is William Shakespeare. Few people will be able to guess which country has honoured this name on its stamps. It was Hungary. They had a set showing world renowned authors, and included Shakespeare and also Byron; but Byron had already been portrayed on the stamps of Greece. A newspaper reporter, J. D. Bourchier, appears on the stamps of Bulgaria, for in 1921 they had a set to commemorate this 'Times' Correspondent.

A very gifted man is shown on the 1910 issue from Newfoundland—Francis Bacon, who lived from 1561 to 1626. The list of posts that he held during his 65 years is quite a substantial one; Solicitor, Treasurer of Gray's Inn, Attorney General, Lord Keeper of the Great Seal, and Lord Chancellor. Sullivan would describe him as a veritable Pooh-Bah.

As we are dealing with men of letters, we must place quite high in the list R. L. Stevenson, surely one of the foremost writers of boys' books. He appears on the 7d. value of the 1939 set from Western Samoa, while in the previous set of 1935 there were two stamps showing his home, 'Vailima', and also his tomb.

In a number of cases people could correctly be placed in more than one list. Mr. Churchill, for instance, could certainly be a great statesman, an artist and a writer. The 15 centavos of the 1948 set from Salvador shows Mr. Churchill in company with Mr. Mackenzie King and President Roosevelt. Charles Darwin (1809-1882) has some well known science books to his credit such as 'The Origin of the Species' and 'The Voyage of the Beagle', and it is the South American country Ecuador which shows him on the 1936 set which commemorates the 100th anniversary of his visit to the Galapagos Isles. On the 20 cent you see a portrait of the scientist above the boat in which he sailed—The Beagle.

Another scientist, Sir Wilfred Thomason Grenfell, is shown to us on the 5c. stamp issued in 1941 by Newfoundland to commemorate Sir Wilfred's Labrador Mission. It shows a picture of Sir Wilfred on the Strathcona. Grenfell was born in 1865. He studied medicine and became a house surgeon at the London Hospital, and fitted out the first hospital ship for the North Sea Fisheries. In 1892 he built five hospitals as well as schools and nursing stations in Labrador and made an annual cruise along the coast in the Strathcona. His book 'Autobiography of a Labrador Doctor' describes his missionary work among fishermen.

There are not very many stamps which bear portraits of British women, in fact one has to think hard to recall those that do—exclusive of royalty, of course. There is one stamp, however, that is an interesting specimen, as two British women are shown. They do not belong to the same period, but they do belong to the same profession—they are

(*Continued foot of page 236*)

Shakespeare's portrait on an Hungarian stamp

Charles Darwin on a stamp from Ecuador

Belgium honours Florence Nightingale

A stamp of Dominica bearing the picture of Rowland Hill

Keep in form this winter with these

HOME-MADE TENNIS TRAINERS

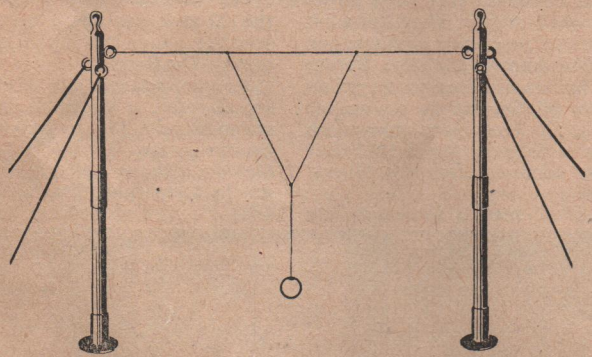
FOR the first of these tennis trainers all you need are four broom handles, two tentpole type metal jointing cups, as sold by Scout Shops and Army Stores (alternatively, any cycle repairer will cut them from frame tubing), two old mop sockets (or something similar) for base-plates, six small screwed ring-hooks, a small ball of sashcord, and a Kumbak tennis-ball (as sold by sports outfitters) ready tethered to a Y shape elastic.

Construction is simple. Pare down the ends of the top poles and the tops of the lower ones, to fit tightly into the tentpole fittings. Do the same for the bottom ends of the lower poles to engage the metal base fittings. One sheet of glasspaper will do the trick. Insert hooks as per diagram.

Side hooks take inverted V guy-lines to hold the poles upright and strain the cross-cord tight. This cross-cord is stretched from pole to pole between the two centre ringhooks. Attach the free ends of the Y elastic to the top cord, ⅓rd and ⅔rds of the length across. Allow the ball to swing 1ft. off the ground.

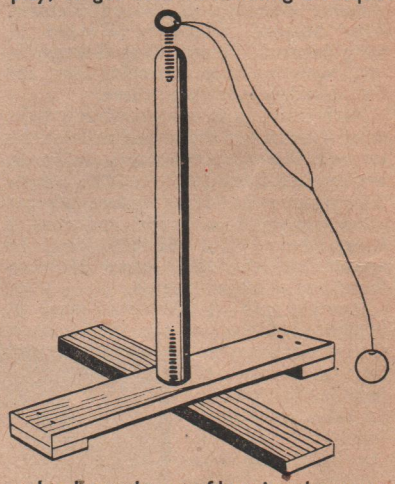
The Second Model

For the second trainer, requirements and construction are just as simple. One round upright post 3ft. by 3ins. diameter, one birdcage type suspension spring, which is let into a vertical hole drilled in the top of the post for half its length, two crosspiece timbers 3ins. by 1in. to provide the base. Screw 3ins. by 1in. by 1in. blocks underneath each end of the top base piece to give a level stance, and join the cross to the upright by a 6in. bolt screwed into a 4in. deep hole drilled in the base of the post. A Kumbak tethered ball completes the outfit.



Both can be used on any surface outdoors, and, where space permits, are equally effective indoors on board floors. Expensive racquets are unnecessary. Almost any junk shop offers second-hand ones quite cheaply. These are easily restrung with stout fishing-line or thin cord or thick cobbler's thread.

Both of these trainers are recommended for beginners to learn stroke play, to get used to handling a racquet and to learn the art of keeping the eye on the ball. They also afford good practice for those who already play tennis. The first can be used by one player each side and the second, if space permits, by up to eight in a circle. (133)



British People on Stamps—(*Continued from page* 235)

Nurse Edith Cavell and Florence Nightingale. These two are on one of the stamps issued by Costa Rica as a special air stamp in connection with the 60th anniversary of the National Red Cross Society in 1945.

Another country, Belgium, gave a portrait of Florence Nightingale in 1939 and this was on the occasion of the 75th anniversary of the International Red Cross. One might, perhaps, be forgiven for departing from the 'People on Stamps' just to mention that Canada, in 1930, gave on the one dollar stamp a picture of the peak in the Rockies named after Nurse Cavell.

There is one particular Englishman, Sir Rowland Hill, who has appeared on the stamps of quite a number of foreign countries, and not unnaturally, because they all owe so much to the work he did. Portugal, Cuba, Dominica, Guatemala, Nicaragua, Paraguay, and Salvador are among the countries. It should not be necessary to remind anyone that it was to Sir Rowland's foresight that the cheap postage, and also the stamp, came when they did.

Now for statesmen. What a galaxy of talent from which to choose. Really, our statesmen have had so much to do with foreign and colonial affairs that it is difficult to find out where to start. Suppose we begin with three men who have been almost equivalent to kings of a certain country—the three Brookes, Sir James, Sir Charles and Sir Charles Vyner Brooke. Sir James was a British subject who assisted a Rajah in putting down a native rebellion; as a reward the Sultan made him a Rajah of Sarawak. He was followed by Sir Charles and he by Sir Charles Vyner Brooke and they appear on the 1869, the 1888 and the 1918 stamps, and all three appear on the centenary stamp of 1946.

This should have appeared actually in 1941, but owing to the war it was delayed and was five years late. There were four values, the 8c., 15c., 50c. and 1 dollar, and the present values of these are as follows: 9d., 1/6, 3/6, and 35/- respectively. So that you see that it pays to buy the highest values of a set, even if you apparently get less for your money. The 1 dollar costs only twice as much as the 50c., but the value of the former is now ten times that of the latter. (224)

Making a buzzer and ELECTRIC BELL

WITH a bell-push fixed in a suitable position this bell will give warning when friends or tradesmen are calling and the bell itself can be fitted up at any point where it is most likely to be heard. Or, without the bell and hammer, it can be used as a buzzer, either for the same purpose, or for signalling.

None of the constructional details are critical and Fig. 1 shows the arrangement of the parts, and will help to make the working clear. When current is applied from a battery the two magnets attract the armature sharply. As a result the smaller strip breaks contact with the contact screw and the electrical circuit is broken. The magnets accordingly release the armature which springs back to its original position, and the cycle of operations is repeated very rapidly. With each movement the hammer strikes the bell.

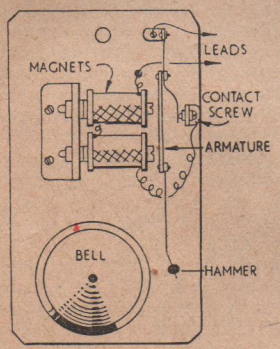


Fig. 1—The completed bell

The wiring circuit is very simple and is shown in Fig. 2. A bell-push and battery are connected in series with the bell. These items may be arranged where convenient and a dry battery of 3 to 6 volts is used. There is no danger whatever of shocks, but if the leads to the bell-push are at all long, fairly thick wire should be used. If these leads are of thin wire the voltage of the battery will have to be increased to compensate for the drop caused by the resistance of the wire.

The bell itself is built upon a base-board which can be hung up where required.

Besides the conventional bell-push, it is possible to arrange two thin strips of metal on a small piece of board in such a way that any pressure completes the circuit. If placed under the doormat this will give warning automatically when anyone calls.

(A) in Fig. 3 should help to make the construction of these quite clear. Two small iron or steel bolts are used, and their actual size is not very critical. A stout cardboard washer about ¾in. in diameter is placed against the head of each bolt. A second washer is put near each threaded end and nuts screwed on.

The bolts are then mounted on the long bracket or yoke, which can be made from two or three thicknesses of tin cut from a can. Further nuts hold the bolts securely in place.

The bobbins thus formed, and shown in Fig. 3, must now be wound full with insulated wire. Something of about 22 to 24 S.W.G. (double cotton covered) is most convenient to handle. Leave an end of about 4ins. and wind one bobbin full. Now take the wire across to the second bobbin and wind that full in the *opposite direction*. (By having all the turns on one bobbin in the opposite direction to the turns on the other the ends of the magnets will be given different magnetic polarity, which increases the power with which the armature is attracted).

The armature is shown at (B) in Fig. 3 and is about ½in. wide. A piece of thin

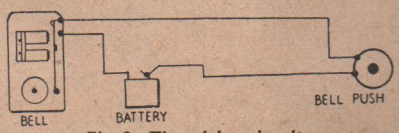


Fig. 2—The wiring circuit

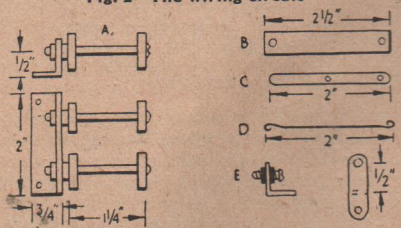
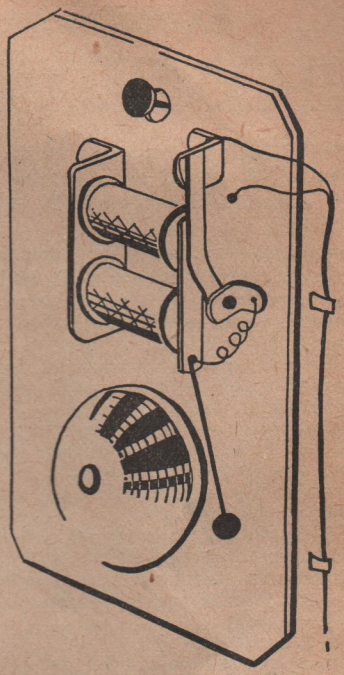


Fig. 3—How to make the magnets, etc.

iron, or a double thickness of tin, can be used. (C) is the flat strip upon which the armature is bolted. The other end of this strip is bolted to a small angle bracket and the strip is bent out a little from the armature, where it touches the contact screw, as shown in Fig. 1. Actually, a piece of thin brass strip such as that found on some flat dry batteries is best for this part, but tin can be used successfully.

Part (D) is bolted to the free end of the armature, and has a nut and bolt at its other end to form the hammer. It is bent up from fairly strong, stiff wire.

(E) is the contact screw on its bracket —a second one similar to that holding



the armature spring. By having a nut each side the bracket the screw can be adjusted when arranging that the bell shall work properly.

Fig. 1 shows where the parts are fixed. About ⅛in. or so should be left between the armature and magnets and the contact screw is placed so that it makes firm contact with the springy strip holding the armature.

The connections are shown. So that the winding is not pulled loose the one end of the magnet wire is anchored to the appropriate lead with a screw driven into the base.

The top of a broken cycle-bell is the best type of bell to use, and it can be fixed with a long screw or a bolt with three nuts. It should be fixed absolutely secure, yet the rim must not rest on the baseboard. A bolt with three nuts will enable this arrangement to be obtained without trouble. If a wood-screw is used washers, or something similar, must be added between bell and baseboard to keep the bell up.

When the battery is connected the armature should vibrate strongly and the position of the contact screw may require to be altered a little to obtain best results. Distance between armature and magnets should not be more than necessary as this weakens the effect. In addition, the armature should not bear back too strongly against the screw.

However, satisfactory results will be obtained easily and it is then only necessary to bend the wire carrying the hammer a little, as required, so that the hammer strikes the bell strongly. (200)

Experiments with starch in HOME CHEMISTRY

STARCH is an important article of diet. Flour and the dry solids of potatoes consist mainly of it, as do arrowroot, tapioca and sago.

Although you may have a domestic supply of starch which you could use for your experiments, it is more interestng to prepare your own from potatoes and flour.

Peel and wash ½lb. of potatoes. Grate them to a pulp on a household grater, collecting juice and pulp on a plate. Pour the whole into a wire vegetable sieve (about twelve holes to the linear inch) held over a basin, and direct a jet of water from your wash bottle on to the pulp, as shown in Fig. 1.

When the basin is nearly full of liquid lower the bottom half of the sieve into the basin, so that the liquid rises up into the pulp. Stir the pulp up well, drain and throw it away.

In the basin you will find a cloudy brown liquid. This contains suspended starch and a little fine potato fibre. To free it from the fibre pour the liquid through a coffee strainer into a two-pound jam jar.

On standing for a while the starch will settle to the bottom of the jar as a hard white layer. Wash it by decantation until the wash water loses its brown colour. Filter off the starch and dry it on a porous tile or brick.

If you examine the starch through a magnifying glass you will see minute glittering particles. A small student's microscope magnifying about fifty times will reveal roughly oval grains, which, at a higher magnification, are seen to have curious concentric ridges on them (Fig.2).

To prepare starch from flour, mix a tablespoonful to a dough with water. Set the dough aside for an hour. Then work it between your fingers and at the same time direct a jet of water upon it from your wash bottle. The starch flows off with the water and the liquid should be collected in a jam jar.

Continue kneading the dough until the water runs off clear. A plastic mass will remain in your hand. This is called gluten. Put this aside until you have worked up your starch suspension. Let the starch settle, wash it twice by decantation and dry it on a porous tile.

A small microscope will show the grains of this wheat flour starch to be much smaller than those of potato starch; also that they are circular. Higher magnification shows these also are ridged (Fig. 2).

If you now take your piece of gluten and pull it you will find it stretches like rubber and contracts again when released. It is this substance which gives the necessary elasticity to dough. Starch alone could not be made into bread.

Gluten is very nourishing and is used to make special bread for diabetics. It contains a lot of nitrogen, which you can prove by heating some in a dry tube. Hold a piece of wet red litmus paper in the cheesy-smelling vapours which are evolved. As the vapours are mixed with ammonia the paper will turn blue. Since ammonia contains nitrogen, then the gluten must contain it, too.

The most sensitive test for starch is the iodine test. Mix a small pinch of potato starch to a cream with a quarter of a test tube full of cold water and pour this into about 50ccs. of boiling water. The starch swells and forms a jelly-like paste.

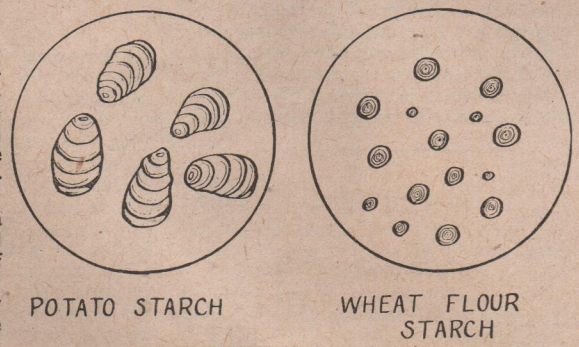


Fig. 2—Magnified starch grains

Dilute a drop of this with a quarter of a test tube full of cold water and add a drop of iodine solution. A deep blue colour appears. If you now boil the blue solution the colour will disappear, but it will return on cooling.

By using this test we can make dextrine from starch. Mix two teaspoonfuls of starch to a cream with cold water first. Then add 10ccs. of dilute (about 10 per cent strength) sulphuric acid to 100ccs. of water in a beaker. Boil the water and add a little starch cream. It will form the usual thickish solution, but will soon become thin. This is because the starch is being converted into dextrine and glucose.

Continue adding the starch cream in small portions until it is used up. Let the boiling proceed for a few minutes and then dilute a few drops of the liquid in a test tube and add iodine solution. If a blue colour develops boil for a few more minutes and test again. Repeat this procedure until a dark red colour is given with iodine.

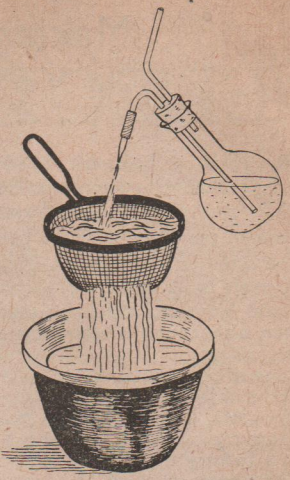


Fig. 1—Obtaining starch

The red colour is caused by the dextrine and proves the starch has all been destroyed. Now neutralise the sulphuric acid in the solution by adding precipitated chalk (calcium carbonate). Insoluble calcium sulphate is formed and may be filtered off.

Evaporate the solution to small bulk and add three or four times its volume of methylated spirit. Pale buff dextrine will be precipitated. Filter it off and dry it on a porous tile.

Dextrine is a substitute for gum and is also known as British gum. Industrially it is made by heating starch to 210 degrees. The glaze on starched linen is due to a thin layer of dextrine formed by the hot iron.

To prepare glucose, repeat the above experiment, but boil for four hours. The dextrine is then converted into glucose. Glucose is made industrially from corn starch by this method. After adding chalk and filtering, evaporate the liquid to small bulk over gauze, then to a thick syrup on the water bath. This is glucose syrup. It crystallises with difficulty, but if you add a few specks of solid glucose it will probably crystallise in a few days.

Many other syrupy solutions which are hard to crystallise may often be induced to do so by adding a crystal or two of the solid substance. This process is known as 'crystal seeding'.

Glucose is one of the substances which reduce Fehling's solution and hence it is useful in preparing cuprous oxide. Add some glucose solution to Fehling's solution and boil. Copper-red cuprous oxide is precipitated, which you can filter, wash and dry for your chemical stock. (219)

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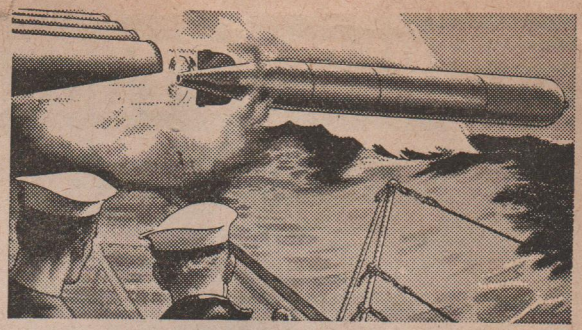

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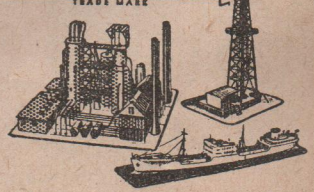

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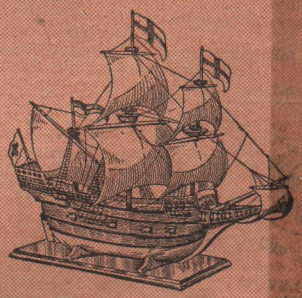

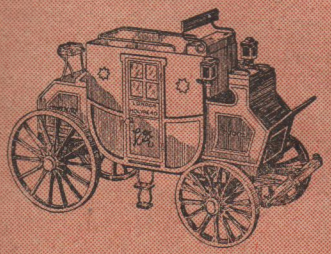

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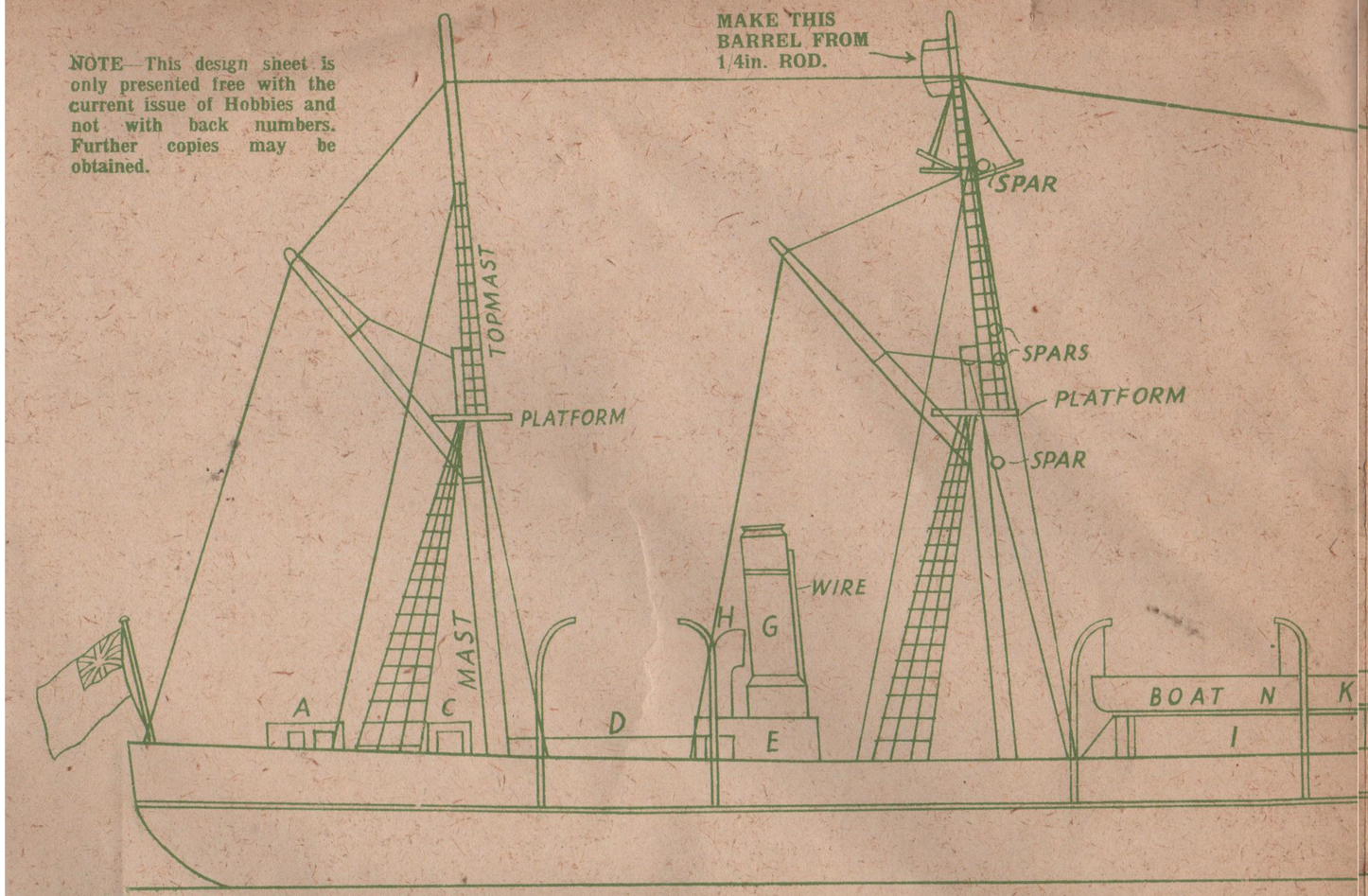

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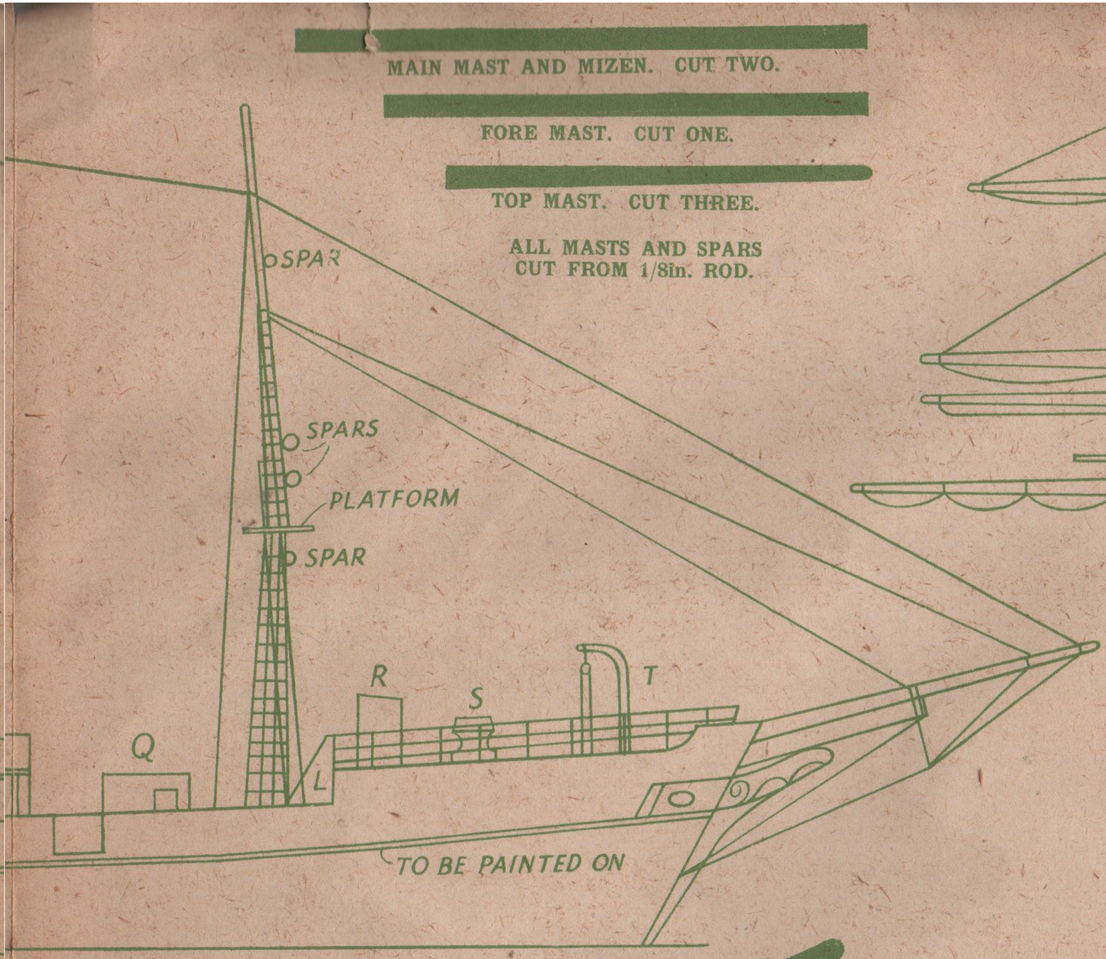

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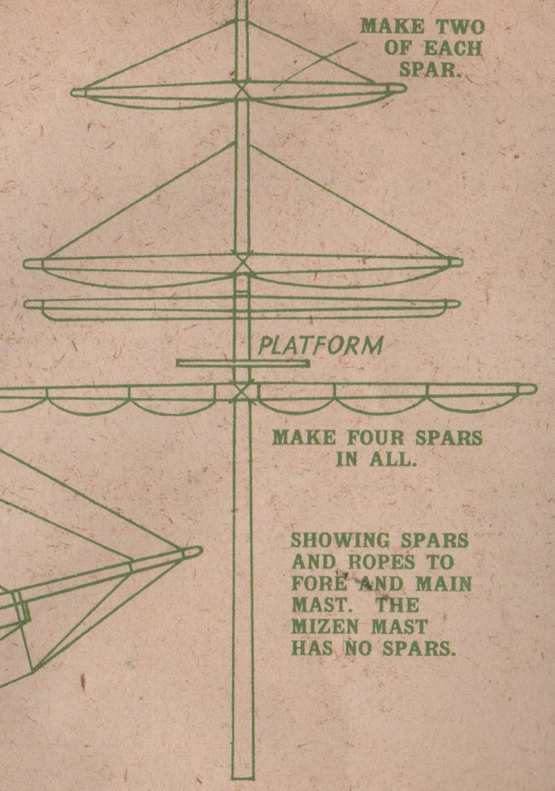

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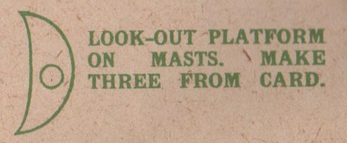
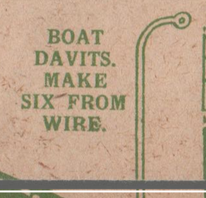
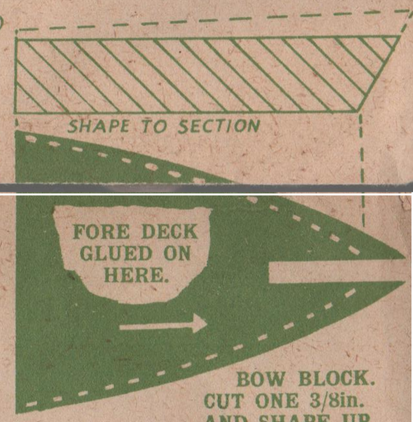
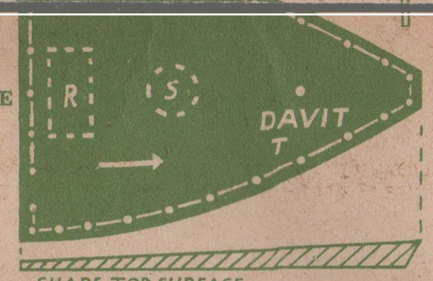
SHOWING SPARS AND ROPES TO FORE AND MAIN MAST. THE MIZEN MAST HAS NO SPARS.

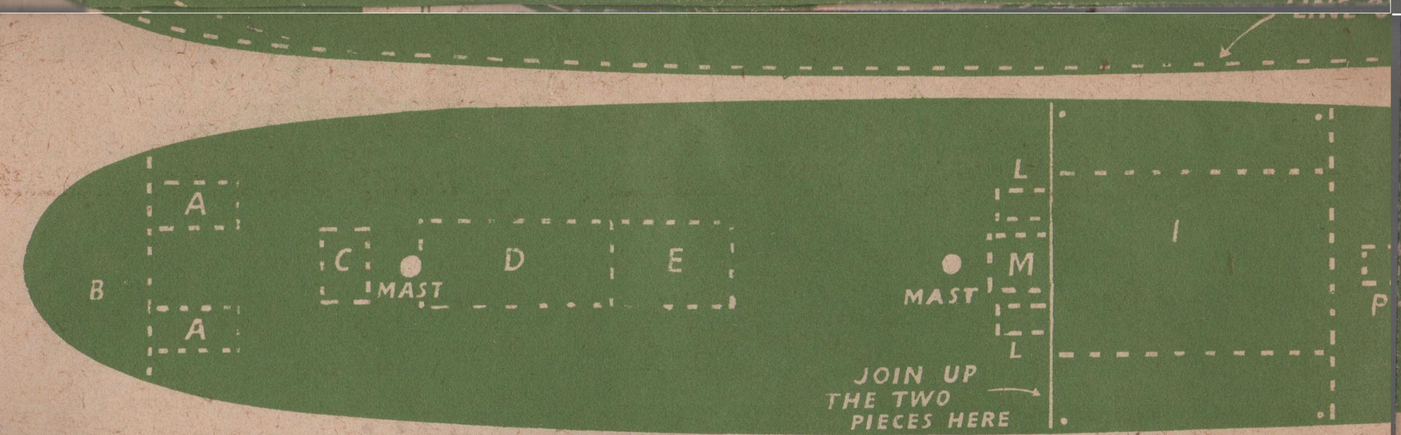




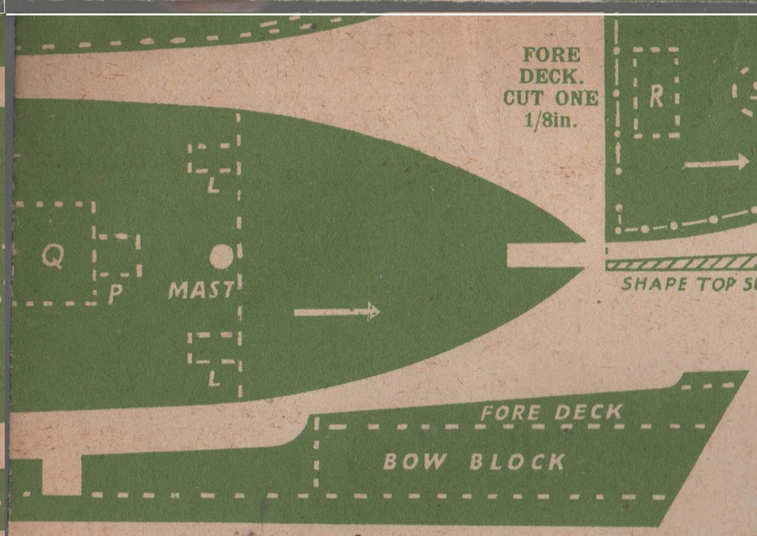




THE ARROWS INDICATE THE DIRECTION OF GRAIN OF WOOD.



DECK. CUT FROM 1/8in. WOOD IN TWO PIECES TO SUIT LENGTH OF PANEL G2.



UPPER SIDE. CUT TWO THIN WOOD.

PIECE B. CUT ONE 1/8in.

PIECE A. CUT TWO 3/8in.

PIECE D. CUT ONE 3/8in. AND SHAPE TO SECTION.

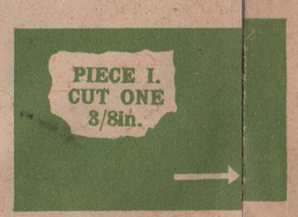
PIECE C. CUT ONE 3/8in. AND SHAPE.

PIECE E. CUT ONE 3/8in.

PIECE F. CUT ONE 3/8in. AND CUT IT DOWN TO THICKNESS SHOWN.

PIECE G. FUNNEL. CUT ONE 1/4in. DIA. ROD.

PIECE H. CUT TWO AND SHAPE UP FROM 1/4in. ROD.

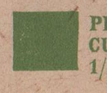


STEPS L. CUT FOUR 1/8in.

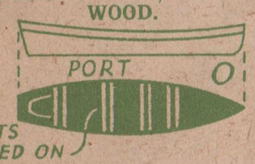
STEPS. CUT EIGHT FROM CARD.

RAIL K. CUT ONE FROM CARD.

RAIL K. CUT ONE FROM CARD AND GLUE TO J.



PIECE M. CUT ONE 1/8in.



CARVE THE BOATS FROM 3/8in. WOOD.

BOATS.

STERN FLAG. MAKE ONE.

DECK LIGHT P. CUT TWO 1/8in.

CUT ONE 3/8in.

PIECE R. CUT ONE 3/8in.

PIECE S. CUT ONE 1/4in. ROD AND SHAPE UP.

DAVIT T. MAKE ONE FROM WIRE.

WIRE SUPPORT FOR J. CUT FOUR PIECES AS SHOWN.

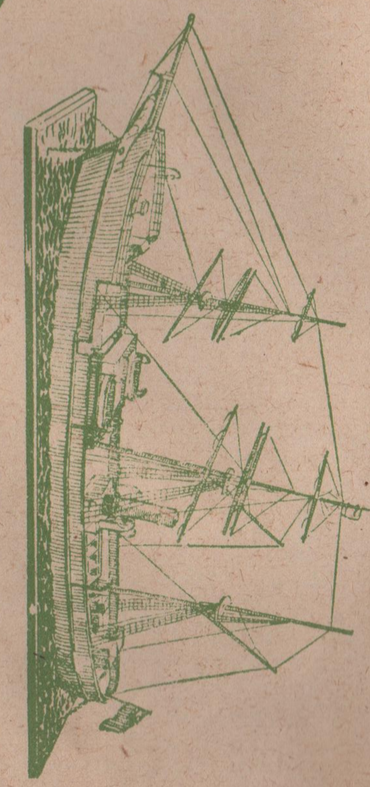
PANELS OF WOOD REQUIRED FOR THIS DESIGN

TWO LD6 ONE G2 ONE PPM

Materials for making this design are supplied by HOBBIES LIMITED, Dereham, Norfolk.

Price on application.

LENGTH (WITHOUT BASE) 12¾ins.



SUPPLEMENT TO HOBBIES No. 2932.

MODEL

ROYAL RESEARCH SHIP 'DISCOVERY'

SEA SCOUT TRAINING SHIP

Hobbies DESIGN

No. 2932 9.1.52

PRINTED IN ENGLAND.